DOCUMENT RESUME

ED 212 870 CE 031 413

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TITLE Tree Identification. Competency Based Teaching Materials in Horticulture.
INSTITUTION Illinois State Board of Education, Springfield. Dept. of Adult, Vocational and Technical Education.; Southern Illinois Univ., Carbondale, Dept. of Agricultural Education and Mechanization.
PUB DATE [80]
NOTE 45p.; For related documents see CE 031 414-421.
AVAILABLE FROM Agricultural Education & Mechanization Dept., Southern Illinois University, Carbondale, IL 62901 ($4.00).

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Agricultural Education; Check Lists; Competency Based Education; Horticulture; Job Skills; *Landscaping; Learning Activities; *Nurseries (Horticulture); Ornamental Horticulture; *Plant Identification; Secondary Education; Storage; Tests; *Trees; Units of Study; Visual Aids

ABSTRACT

This competency-based curriculum unit on tree identification is one of five developed for classroom use in teaching the landscape/nursery area of horticulture. The three sections are each divided into teaching content (in a question-and-answer format) and student skills that outline steps and factors for consideration. Topics covered include identifying plant material (by leaf), using proper storage techniques, and quality sorting nursery stock prior to shipment. A list of references precedes a section containing visual aids, student skill checklist, and student activities, such as field trips, handouts, discussion activities, worksheets, crossword puzzles, hands-on experiences, tests, and quizzes. Answer keys are provided. (YLB)

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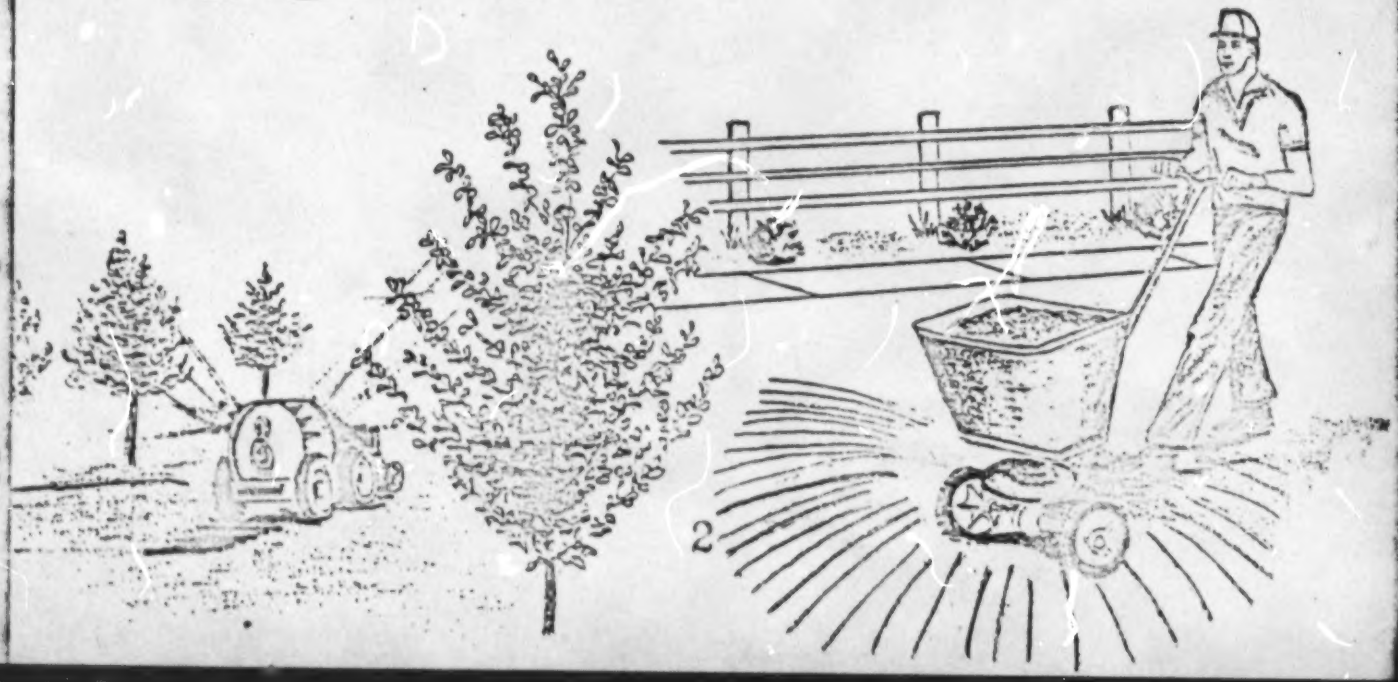
Tree Identification

Competency Based Teaching Materials in Horticulture



CE031413

Listed below are competency based curriculum units developed for classroom use in teaching horticulture. All units are indexed and include teaching content, references, student activities, a skill check list, and visual aids.

LANDSCAPE/NURSERY Tree Identification Developing a Landscape Plan Implementing the Landscape Plan Maintaining the Landscape Nursery Propagation	GREENHOUSE PRODUCTION & MANAGEMENT Controlling the Greenhouse Environment Greenhouse Soils Foliage Plants Propagation Sales Cut Flower Production Bedding Plants
TURF AND LAWN SERVICES Identification of Turf Grasses Soils and Fertilizers Planting Turf Grasses Insects and Diseases	VEGETABLE PRODUCTION Identification of Cool Season Vegetables Identification of Warm Season Vegetables Vegetable Production Insects, Diseases, and Weeds
FRUIT PRODUCTION (In progress)	

ACKNOWLEDGEMENT

This material was prepared by: Jim Legacy, Fred Reneau, Thomas Stitt, Terry Savko, Amy Swigart, Kathy Cummings, Carole Daesch, Sharon Flanagan, and 42 Illinois teachers of horticulture, in cooperation with the Illinois State Board of Education, Department of Adult, Vocational and Technical Education, and the Department of Agricultural Education and Mechanization, Southern Illinois University.

TREE IDENTIFICATION

CONTENTS

IDENTIFYING PLANT MATERIAL (BY LEAF) 1

Leaf composition, leaf arrangement, leaf venation,
Leaf characteristics
Key a specimen

USE PROPER STORAGE TECHNIQUES 5

Selecting plant specimens
Storage methods
Storage of specimens

QUALITY SORT NURSERY STOCK PRIOR TO SHIPMENT 6

Identify grade criteria, types of grading methods
Categorize plants
Label plants

REFERENCES 9

STUDENT ACTIVITIES 10

Tree Identification

IDENTIFYING PLANT MATERIAL (BY LEAF)

Teaching content: 4 questions; 7 student skills

Question 1 What are the five types of leaves?

- Simple
- Palmately compound
- Odd-pinnately compound
- Even-pinnately compound
- Bipinnately compound

*A/V

Question 2 What are the 5 types of leaf arrangements?

- Fascicled
- Clustered
- Alternate
- Opposite
- Whorled

*A/V

Question 3 What are the 5 major types of inflorescense (flower clusters)?

- Spike
- Raceme
- Catkin
- Cyme
- Umbel

*A/V

Student Skill 1

LOCATE BUD PLACEMENT

Steps	Factors for Consideration
1. Hold twig or stem	
2. Locate a leaf	2. Assuming tree is in-leaf
3. Look for nodule at leaf stem's base	3. That is a bud
4. Look for others	

Student Skill 2

DETERMINE LEAF COMPOSITION

Steps	Factors for Consideration
1. Locate bud	
2. Determine if bud is located in axil of a single leaf and the stem	2. Simple: Ex: Quercus
3. Determine if bud is located in axil of a structure with more than one leaf	3. Pinnately compound: Ex: Robinia pseudoacacia
4. Leaflet is attached to common point	4. Palmately compound: Ex: Hippocastanaceae
5. Pinnately compound leaf with even number of leaflets	5. Even pinnate: Ex: Acer negundo
6. Pinnately compound leaf with odd number of leaflets	6. Odd pinnate. Ex: Carya
7. Pinnately compound leaf divided again. Leaflet is actually another leaf-bearing axis with additional leaflets	7. Bipinnately compound. Ex: Gleditsia triacanthos
8. Simple, but not broad. Scale-shaped	8. Scale-like. Ex: Juniperus
9. Simple, but not broad. Needleshaped	9. Needle-like. Ex: Pinus

Student Skill 3

DETERMINE LEAF ARRANGEMENT

Steps	Factors for Consideration
1. Locate buds and leaves	
2. Determine if leaves and buds are directly across from each other on stem.	2. Opposite
3. Leaves and buds are spaced in alternating fashion along stem's axis.	3. Alternate
4. Three buds and leaves are present at one node.	4. Whorled

Question 4 What are the 4 major types of venation?

- Parallel
- Palmate
- Pinnate
- Arcuate

*A/V

Student Skill 4

DETERMINE LEAF VENATION

Steps	Factors for Consideration
1. Locate a leaf	
2. Determine if <u>one</u> prominent vein (midrib) extends from (base) place where petiole attaches to blade to the tip.	2. Pinnate
3. <u>Several</u> main veins extend from base to tip of each lobe.	3. Palmate

Student Skill 5

IDENTIFY LEAF CHARACTERISTICS

Steps	Factors for Consideration
1. Identify leaf shape	1. Use visual aids
2. Identify leaf base	2. " " "
3. Identify leaf margin	3. " " "
4. Identify leaf tip	4. " " "

Student Skill 6

KEY A SPECIMEN

Steps	Factors for Consideration
1. Obtain specimen to be identified	1. In this case, a leaf
2. Identify features	2. Composition, arrangement, venation, and other characteristics
3. Obtain a key	3. All keys differ, but are similar in procedure for operation
4. Use the key	4. Use this procedure: a) Read statement #1. If it is true, go to the next #1 ... and so on ... b) Read statement #8. If it is true, go to #9; if it is false, go to the next #8 c) Continue in this manner until you reach a species name--this is the identification
5. Identify specimen	5. Practice will improve efficiency

Student Skill 7

CHECK IDENTIFICATION

Steps	Factors for Consideration
1. Locate other characteristics helpful for identification.	1. Bark texture and color, fruit, bud and twig, flower or shape

USE PROPER STORAGE TECHNIQUES

Teaching content: 1 question; 3 student skills

Student Skill 1

SELECT SPECIMENS

Steps	Factors for Consideration
1. Determine specimens for selection	1. See supervisor for information
2. Locate specimens	2. Use nursery map
3. Identify specimens	3. By species, grade or geographically

Student Skill 2

SELECT STORAGE METHOD

Steps	Factors for Consideration
1. Identify growth stage	1. Will be "dormant" or "in-leaf"
2. Determine length of term for storage	2. For winter, or temporary
3. Select storage method	3. Several methods may apply

Question 1 What are the alternative methods that apply to storing trees?

Alternatives	Factors for Consideration
1. Heel-in	- Versatile-for either growth stage, but temporary
2. Shade-house	- For "in-leaf" trees Reduce transplant shock
3. Cooler	- For dormant
4. Poly-house	- For dormant
5. Leave in ground	- Best method to insure survival, if practical

Student Skill 3

STORE SPECIMENS (Heel-in*)

Steps	Factors for Consideration
1. Determine size of trench	1. Should be deep enough to cover roots. Should be long enough so roots of one plant won't intertwine with another plant's
2. Dig trench	2. Use a 45° angle
3. Place trees in trench	3. Space to avoid intertwine which will cause damage when removed.
4. Cover roots with soil	4. Make certain roots are completely covered
5. Compact soil	5. Lightly stamp on soil and roots
6. Provide shade	6. Direct sunlight is undesirable since growth is not an objective

*Since most methods require just the transfer of materials, only heeling-in will be described.

QUALITY SORT NURSERY STOCK PRIOR TO SHIPMENT

Teaching content: 1 question; 5 student skills

Student Skill 1

IDENTIFY GRADE CRITERIA

Steps	Factors for Consideration
1. Obtain purchase order	1. See supervisor
2. Identify types of specimens	2. Read order
3. Determine method for grading	3. Several methods may apply

Question 1 What types of grading methods are there?

Alternatives	Factors for Consideration
1. Caliper	- Most common since it is diverse and descriptive
2. Height of branching	- For "street trees"
3. Height relationship to caliper	- Helpful for selecting "shade trees"
4. Height	- Special uses
5. Form of growth	- Important for specific landscape selection
6. Spread of roots	- Indicates vigor of bare root trees
7. Ball size and/or depth	- Related to height
8. Age (years in seed bed and number of transplants)	- Common for "seedlings"
9. Container size	- In diameter (inches) or volume (quart/gallon)
10. Spread	- For conifers and broadleaf evergreens

Student Skill 2

MEASURE SPECIMENS

Steps	Factors for Consideration
1. Hold caliper up to specimen	1a Take measurement 6" above ground level, if 4" diameter or less
	1b If more than 4", take at 12"
2. Read scale in inches	2. If a minimum and a maximum are specified, an average may be used for approximation.

Student Skill 3

CATEGORIZE

Steps	Factors for Consideration
1. Measure specimens	1. Using caliper, tape, or by "eye-balling"
2. Place specimens in groups	2. Transfer to a specified area or label specimen

Student Skill 4

LABEL

Steps	Factors for Consideration
1. Obtain materials	1. Tags, wire or tape, marker
2. Mark grade on tag	
3. Affix tag to specimen	3. Wire to a branch or tape on container

Student Skill 5

IDENTIFY DESIRED GRADE

Steps	Factors for Consideration
1. Obtain purchase order	1. Same one used to identify grade criteria
2. Determine desired grade	
3. Locate specimens	3. Find area where that group is located, or segregate those labeled specimens of that grade
4. Gather specimens	4. Place specimens together in an area where they may be easily picked up

TREE IDENTIFICATION

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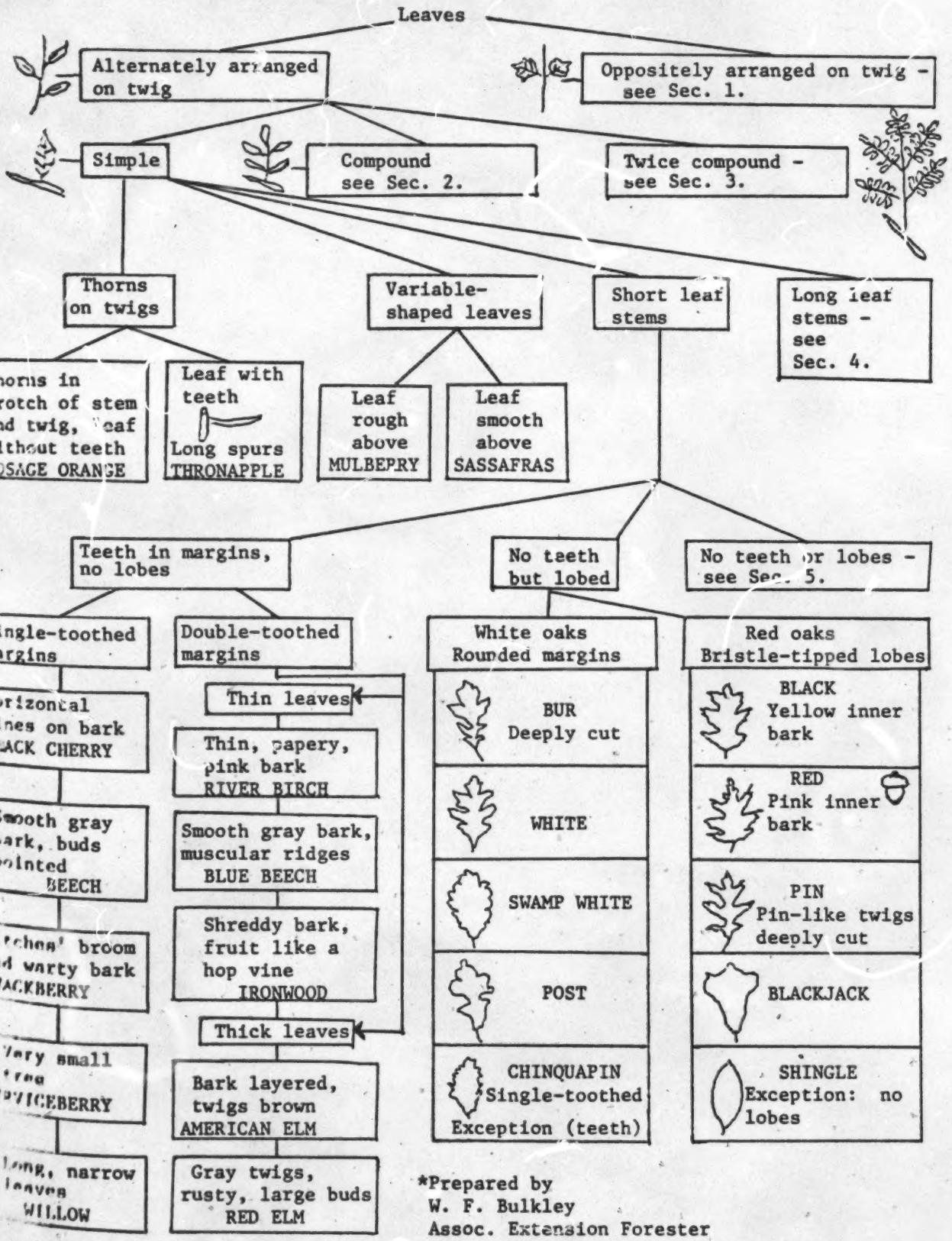
STUDENT ACTIVITIES

CHART FOR IDENTIFYING SOME COMMON NATIVE AND INTRODUCED FOREST TREES OF ILLINOIS IN SUMMER - BROADLEAVES SPECIES*


Leaves
Alternately arranged on twig
Oppositely arranged on twig - see Sec. 1.
Simple
Compound see Sec. 2.
Twice compound - see Sec. 3.
Thorns on twigs
Variable-shaped leaves
Short leaf stems
Long leaf stems - see Sec. 4.
Thorns in crotch of stem and twig, leaf without teeth OSAGE ORANGE
Leaf with teeth
Long spurs THRONAPPLE
Leaf rough above MULBERRY
Leaf smooth above SASSAFRAS
Teeth in margins, no lobes
No teeth but lobed
No teeth or lobes - see Sec. 5.
Single-toothed margins
Double-toothed margins
White oaks Rounded margins
Red oaks Bristle-tipped lobes
Horizontal lines on bark BLACK CHERRY
Smooth gray bark, buds pointed BEECH
Witches' broom and warty bark HACKBERRY
Very small tree HUCKLEBERRY
Long, narrow leaves WILLOW
Thin leaves
Thin, papery, pink bark RIVER BIRCH
Smooth gray bark, muscular ridges BLUE BEECH
Shreddy bark, fruit like a hop vine IRONWOOD
Thick leaves
Bark layered, twigs brown AMERICAN ELM
Gray twigs, rusty, large buds RED ELM
BUR Deeply cut
WHITE
SWAMP WHITE
POST
CHINQUAPIN Single-toothed Exception (teeth)
BLACK Yellow inner bark
RED Pink inner bark
PIN Pin-like twigs deeply cut
BLACKJACK
SHINGLE Exception: no lobes

*Prepared by
W. F. Bulkley
Assoc. Extension Forester
University of Illinois, Urbana

IDENTIFICATION CHART - BROADLEAVED SPECIES (CONTINUED)

Section 1.--Leaves Oppositely Arranged on Twig

- Simple
  - Lobed
    - Rounded leaf crotches — SUGAR MAPLE
    - Sharp leaf crotches — SILVER MAPLE
  - No lobes
    - Heart-shaped leaf — CATALPA
    - Oval-shaped leaf — FLOWERING DOGWOOD
- Compound
  - 3 to 5 leaflets, green twigs — BOXELDER
  - 5 leaflets attached at one point — BUCKEYE
  - 7 or more leaflets, canoe-paddle seed — ASHES

Section 2.--Leaves Alternately Arranged on Twig and Compound

Number of leaflets

- 5 — Shaggy bark — SHAGBARK HICKORY
- 5 to 7 — Little buds — PIGNUT HICKORY
- 7 to 9 — Big buds, wavy bark — MOCKERNUT HICKORY
- 7 to 9 — Yellow buds — BITTERNUT HICKORY
- 7 to 17 — Short thorns — BLACK LOCUST
- 13 to 23 — Chocolate-colored bark — BLACK WALNUT
- 13 to 41 — Gray bark — AILANTHUS (Heaven tree)

Section 3.--Leaves Alternately Arranged on Twig, Twice Compound

- Long-branched thorns or spurs on twigs and trunk, some leaves once compound — HONEY LOCUST
- No thorns, twigs with mottled colored branches, leaves one to three feet long — COFFEETREE

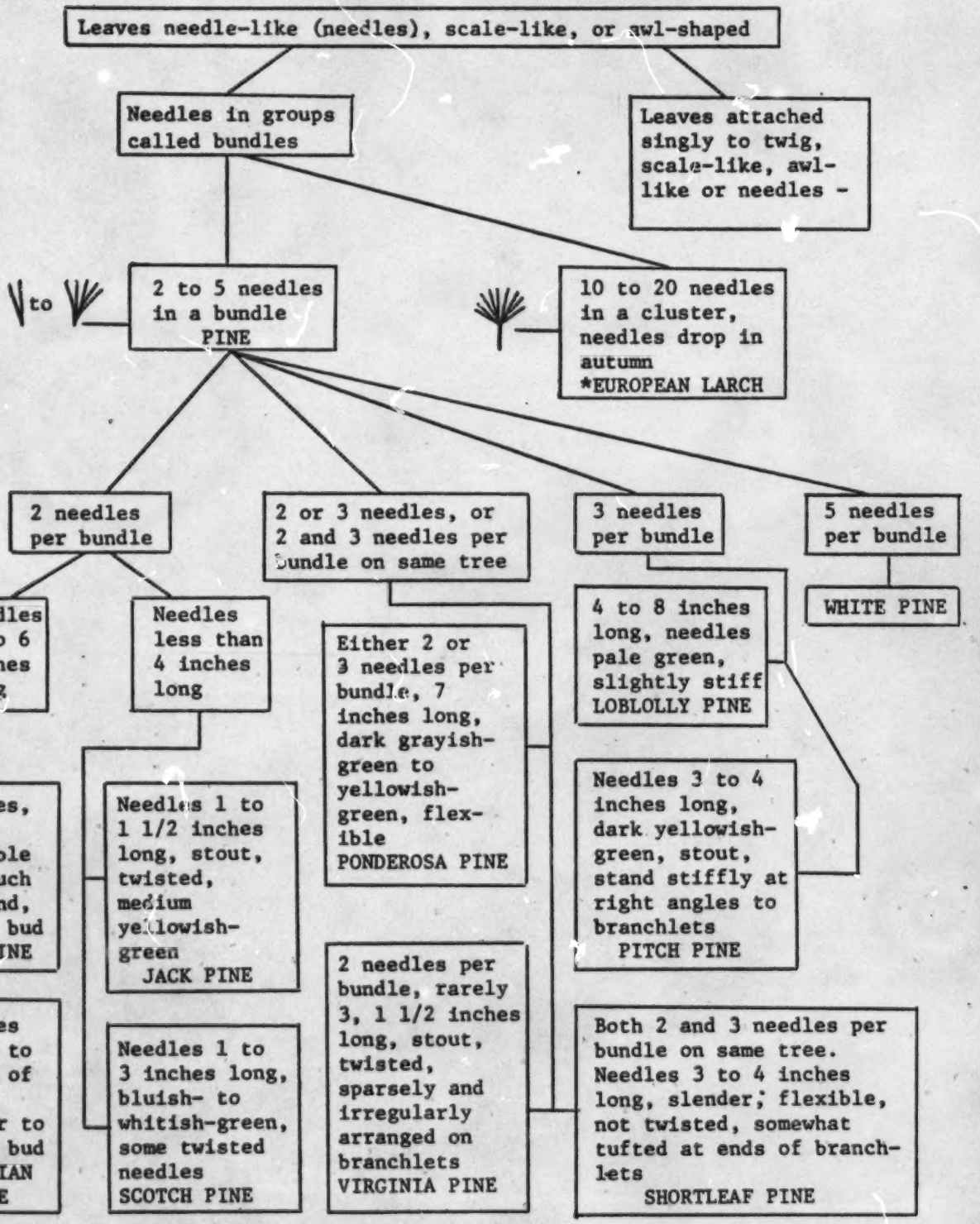
Section 4.--Leaves Alternately Arranged on Twig, Simple Long Leaf Stems

- Flat stems
  - Thick stems, delta-shaped leaves — COTTONWOOD
  - Thin stems, circular shaped leaves — ASPEN
- Rounded stems
  - Clasps on leaf stems
    - Base of leaf stem swollen — SYCAMORE
    - Top of leaf notched — TULIPTREE
  - No clasps on leaf stems
    - Star-shaped leaves — RED GUM
    - Both ends of leaf stems swollen — REDBUD
    - Heart-shaped leaf, seed on wing — BASSWOOD

Section 5.--Leaves Alternately Arranged on Twig, Simple, Short Stems and No Teeth or Lobes

- Oval-shaped
  - Bark with small squares, deeply furrowed, plum-like fruit, generally small tree. Central and southern Illinois — PERSIMMON
  - See red oaks — Bark thin with shallow furrows, fruit an acorn — SHINGLE OAK
- Broader near tip than at base
  - Bark with oblong blocks, also deeply furrowed, alligator-like skin, fruit in 2's or 3's, 1/3 inch long, large tree — BLACK GUM, TUPELO, SOUR GUM

CHART FOR IDENTIFYING CONIFEROUS FOREST TREES
PLANTED IN ILLINOIS - ALL EVERGREEN EXCEPT ONE*

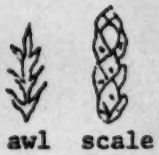

Leaves needle-like (needles), scale-like, or awl-shaped
Needles in groups called bundles
Leaves attached singly to twig, scale-like, awl-like or needles -
to
2 to 5 needles in a bundle PINE
10 to 20 needles in a cluster, needles drop in autumn *EUROPEAN LARCH
2 needles per bundle
2 or 3 needles, or 2 and 3 needles per bundle on same tree
3 needles per bundle
5 needles per bundle
WHITE PINE
Needles 4 to 6 inches long
Needles less than 4 inches long
Either 2 or 3 needles per bundle, 7 inches long, dark grayish-green to yellowish-green, flexible PONDEROSA PINE
4 to 8 inches long, needles pale green, slightly stiff LOBLOLLY PINE
Needles, soft flexible to touch of hand, brown bud RED PINE
Needles 1 to 1 1/2 inches long, stout, twisted, medium yellowish-green JACK PINE
Needles 3 to 4 inches long, dark yellowish-green, stout, stand stiffly at right angles to branchlets PITCH PINE
Needles stiff to touch of hand, silver to white bud AUSTRIAN PINE
Needles 1 to 3 inches long, bluish- to whitish-green, some twisted needles SCOTCH PINE
2 needles per bundle, rarely 3, 1 1/2 inches long, stout, twisted, sparsely and irregularly arranged on branchlets VIRGINIA PINE
Both 2 and 3 needles per bundle on same tree. Needles 3 to 4 inches long, slender, flexible, not twisted, somewhat tufted at ends of branchlets SHORTLEAF PINE

IDENTIFICATION CHART - CONIFEROUS TREES (CONTINUED)
ONE TREE DECIDUOUS*

Leaves singly attached to twig or scale-like in form

Needles (leaves) singly attached, arranged alternately, and either spirally or two-ranked

Leaves scale-like or awl-shaped, oppositely arranged



All scale-like leaves, fan-like branchlets, sprays (larger twigs) flattened, cones about 1/2 inch long
(White Cedar)
ARBOR VITAE

Two types of leaves: awl-shaped (sharp-pointed and scaly), branchlets 4-sided, sprays not flattened, fruit a berry
RED CEDAR

Needles 4-sided, diamond-shaped in cross section
SPRUCES

Needles flat in cross section, lower sides with 2 white bands

Dark green needles, branchlets hanging from twigs, cones 4 to 6 inches long
NORWAY SPRUCE

Bluish-green needles, branchlets not hanging from twigs, cones 1 to 2 inches long
WHITE SPRUCE

Silvery blue to bluish-green needles, stout, very rigid, and sharp-pointed
BLUE SPRUCE

Needles spirally arranged and more than two ranked

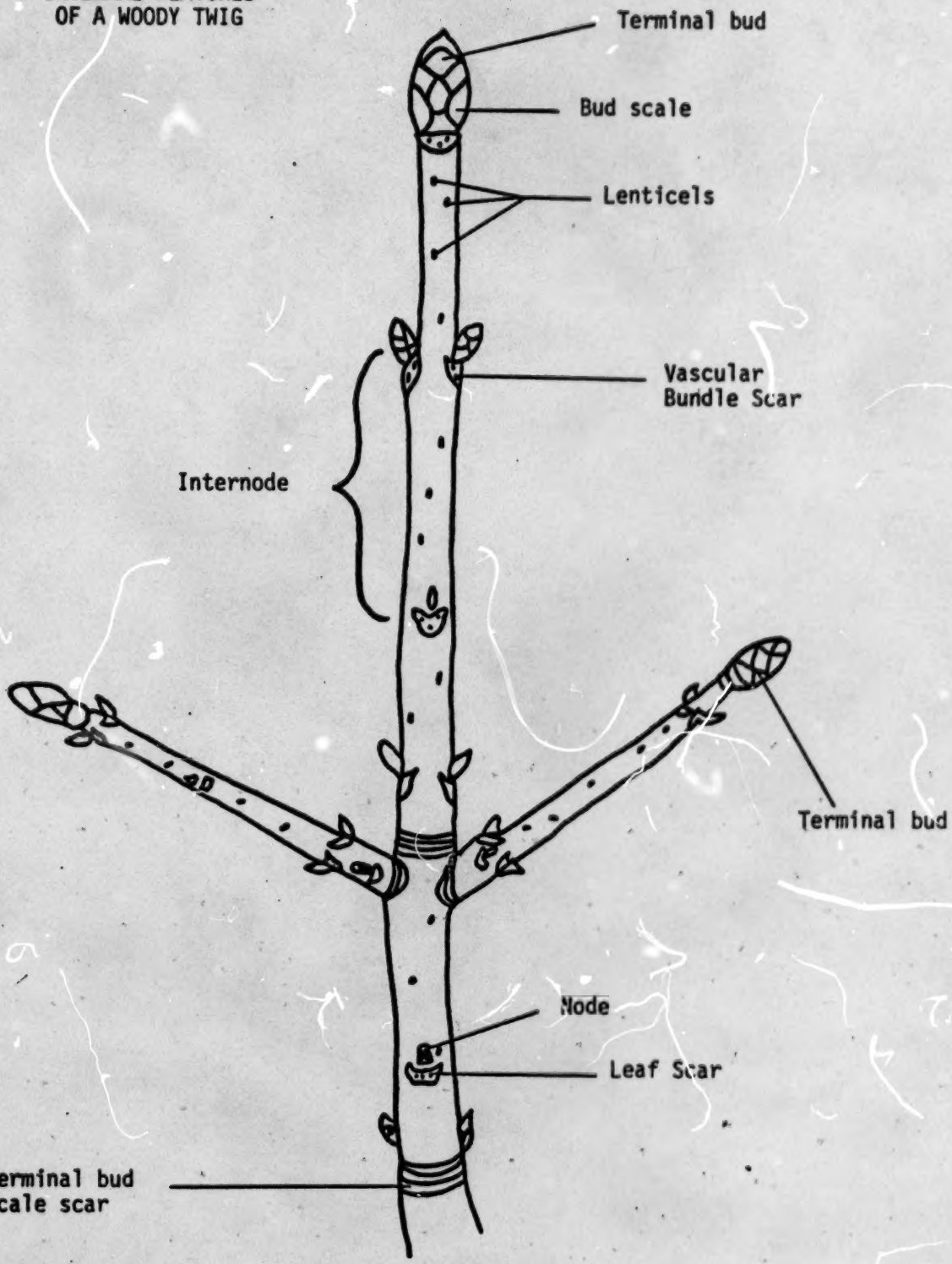
Needles 1/2 to 1 1/2 inches long, dark green to bluish-green, reddish-brown sharp-pointed bud, cone with 3-pointed bracts on scales
DOUGLAS FIR

Needles arranged on twig in 2 ranks

Needles 1/2 to 3/4 inch long, yellowish-green on both sides, feathery-like, drop off in winter with branchlets
*BALD CYPRESS

Needles 1/3 to 2/3 inch long, dark green except in spring, yellowish-green, tips of needles rounded
HEMLOCK

EXTERNAL FEATURES
OF A WOODY TWIG

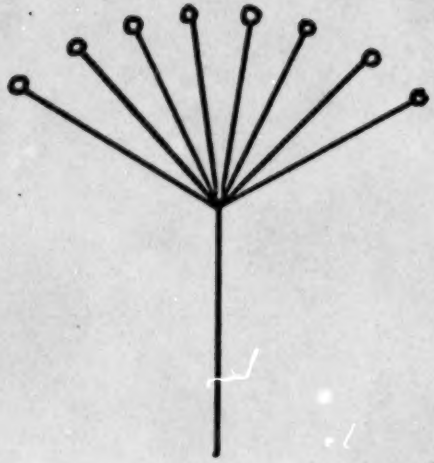


TYPES OF INFLORESCENCES

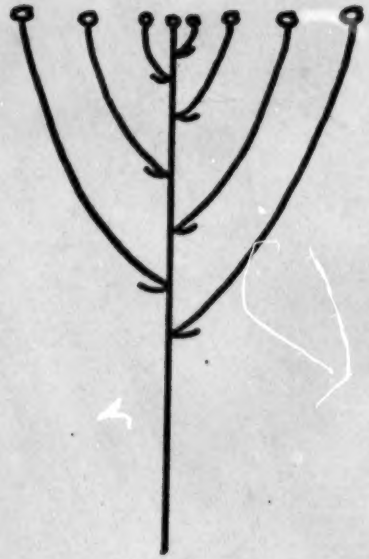
Raceme

Spike

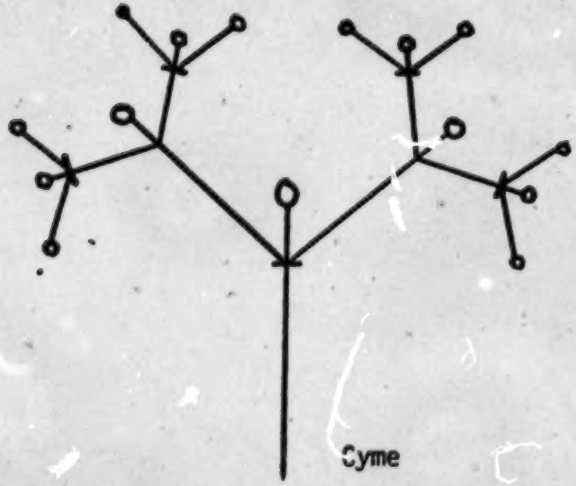
Capitulum



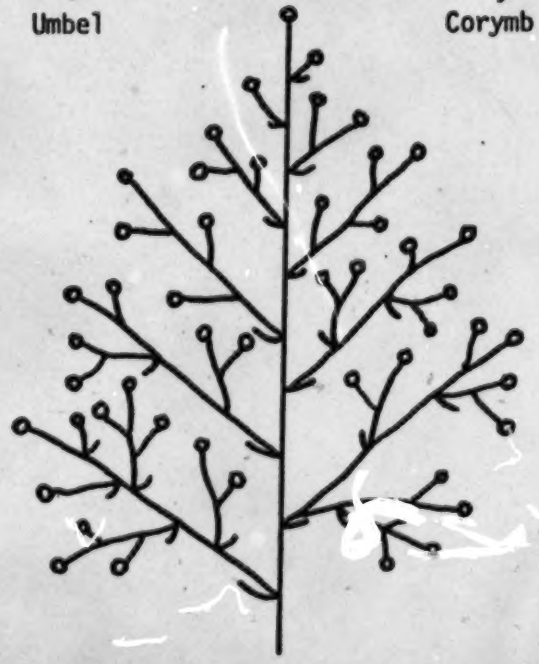
Umbel



Corymb



Cyme



Panicle

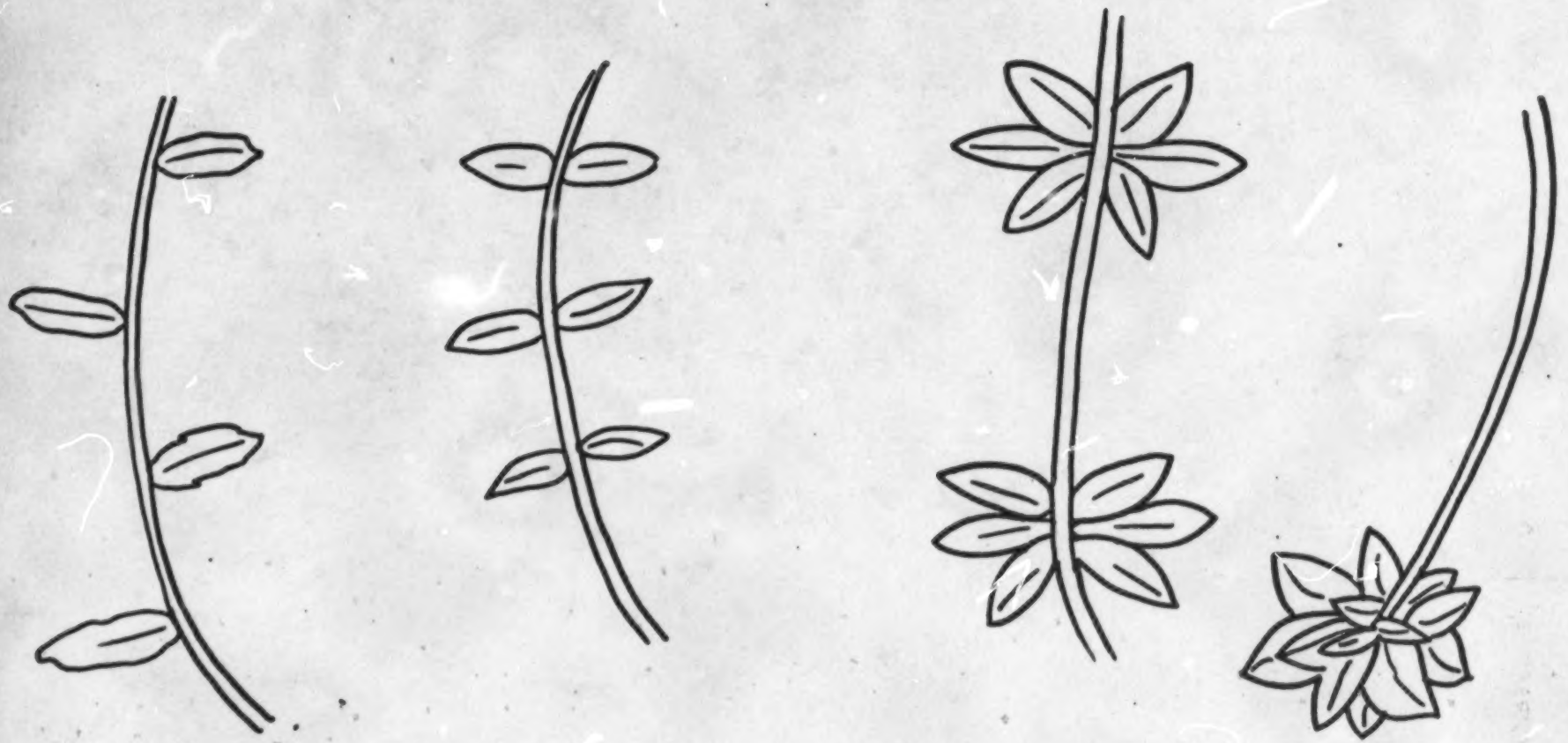
TYPES OF LEAF VENATIONS

PALMATE

PINNATE

PARALLEL

LEAF ARRANGEMENTS



ALTERNATE

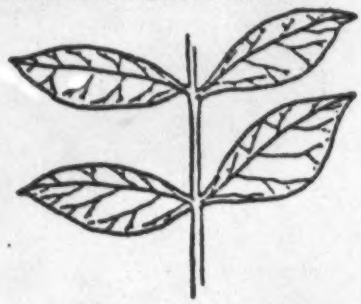
OPPOSITE

WHORLED

ROSETTE

LEAF FORMS AND ARRANGEMENT

SIMPLE

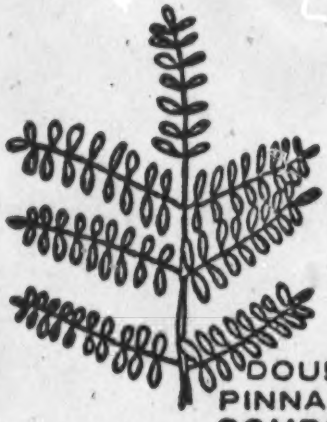


OPPOSITE

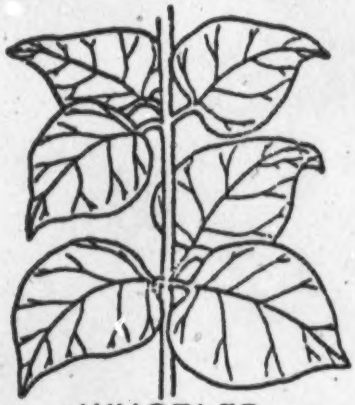
PINNATELY COMPOUND

ALTERNATE

PALMATELY COMPOUND

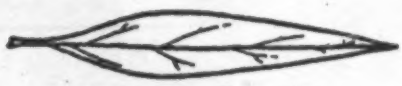


DOUBLY PINNATELY COMPOUND



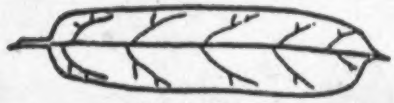
WHORLED

LEAF SHAPES

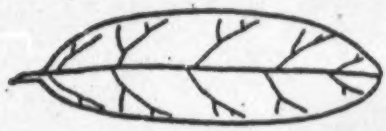


LANCEOLATE

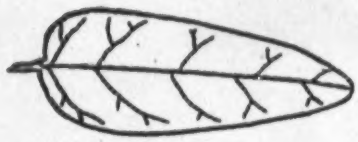
OBLANCEOLATE



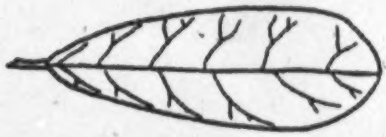
OBLONG



ELLIPTICAL

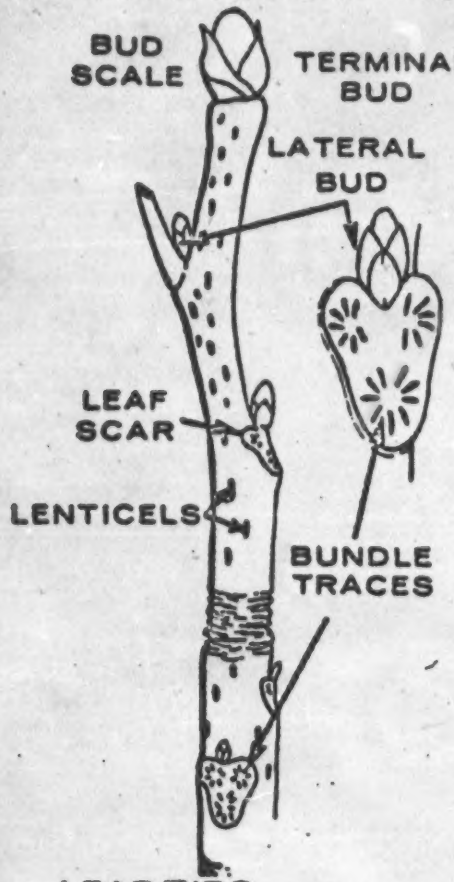


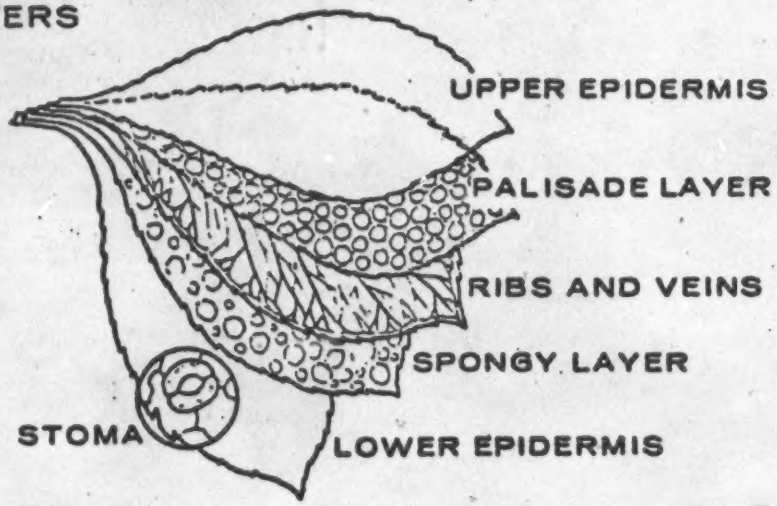
OVATE



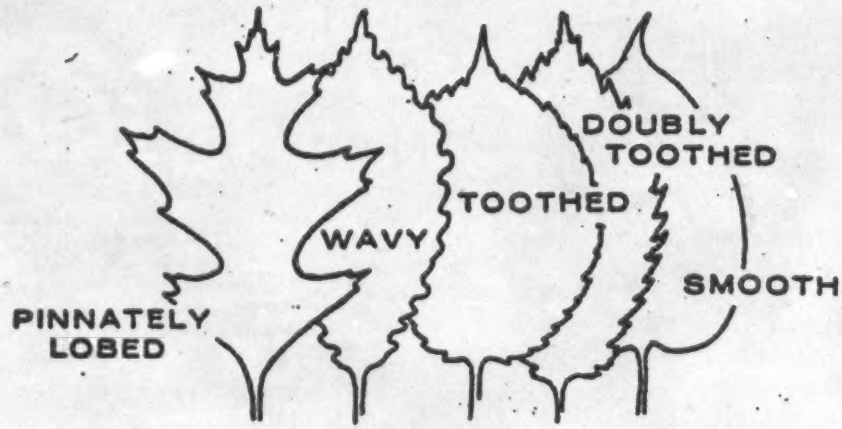
OBOVATE

WINTER TWIG CHARACTERS



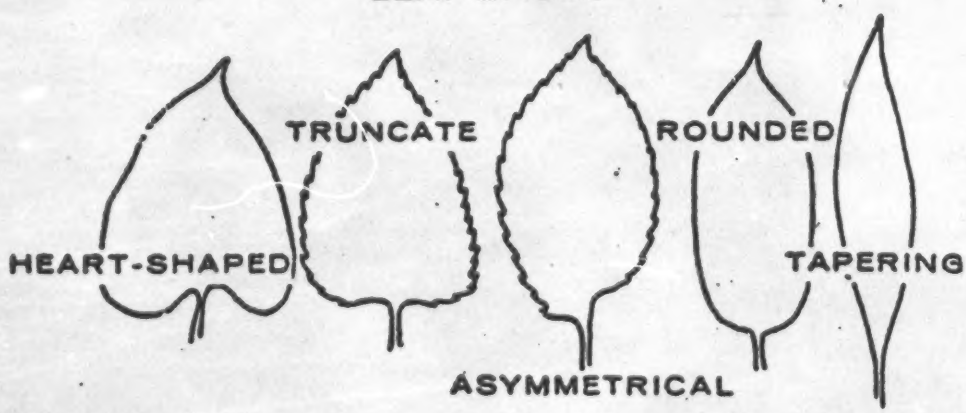


LEAF EDGES



LEAF TIPS

LEAF BASES



TREE IDENTIFICATION

Plant Morphology

TYPES OF LEAVES

1. The simple leaf: It is the position of the bud that determines whether the leaf is simple or compound. Observe that the bud is located in the axil of a single leaf. When there is only one leaf on the petiole, the leaf is called simple.

2. Pinnately Compound leaf: Note that the bud is located in the axil of a structure with more than one leaf. When a leaf is made up of several leaf blades (called leaflets) attached to the petiole, the leaf type is called compound.

3. Palmately Compound leaf: Has a single petiole with each leaflet attached at a common point. Examples are the Buckeyes and the Virginia Creeper.

4. Odd Pinnate leaf: Has leaflets oppositely arranged along each side of a common axis with one leaflet at the end of the petiole. Examples are the Box Elder and the American Ash.

5. Even Pinnate leaf: Has leaflets oppositely arranged along each side of a common axis. Examples are the common Honey Locust and the Siberian Peashrub.

6. Bipinnately Compound leaf: Is composed of pinnate leaves oppositely arranged along a petiole. Examples are the Kentucky Coffee Tree and the Mimosa.

Note that the following are coniferous leaf types or cone-bearing plants.

7. Awl-like needles or leaves: Are shaped like a gardening trowel and stand outward away from the stem. They are very sharp to the touch. An example would be the Junipers.

8. Scale-like foliage: Overlaps like the shingles on a roof or the scales on a fish. Examples are Arborvitae and Falsecypress.

9. Needle-like foliage: Is usually straight and slender like a common needle. Examples are Firs, Pines, and Cedars.

LEAF AND BUD ARRANGEMENT

There are four leaf and bud arrangements but only the first two are the most commonly found.

1. Opposite leaf arrangement: The leaves and buds are directly across from each other on the stem. Examples are Maples, Honeysuckle, and the Viburnums.

2. Alternate leaf arrangements: The leaves and buds are spaced in alternating fashion along the axis of the stem. Examples are Birches, Beeches, and Oaks.

3. Subopposite leaf arrangement: Subopposite refers to a condition where the leaves and buds are not spaced far enough apart to be considered alternate, nor are they perfectly opposite; hence, the term subopposite. Examples are the Common Buckthorn and the Katsura Tree.

4. Whorled leaf arrangement: Refers to a condition where three buds and leaves are present at a node. Examples are the Catalpa Tree and Panicle Hydrangea "Grandiflora".

TYPES OF LEAF VENATION

There are four types of leaf venation; however, the first two types are most commonly found.

1. Pinnate venation: The vein pattern resembles that of a fish skeleton. Examples are Elms and Oaks.

2. Palmate venation: This pattern has several major veins of the same size which radiate out from the leaf vase. The veins extend all the way to the apex of the leaf lobes. Examples are the Maples and the Sycamore.

3. Dichotomous venation: In this pattern, the vasal veins extend for a distance and then branch forming a "Y" type pattern. The one rare example is the Ginkgo Tree.

4. Parallel venation: This type is typical of many moncotyledonous plants. The veins run essentially parallel to each other along the long axis of the leaf. Examples are corn and the grasses.

SHAPES OFTEN FOUND IN LEAVES

1. The lanceolate leafshape: is shaped like a spear head.

2. Ovate leafshape: Is eggshaped in outline, broadest below the middle; like an oval.

3. Cordate leafshape: Is heart shaped. The term cordate is properly applied ONLY to the bases of leaves.

4. Elliptical leafshape: Has the outline of an ellipse, broadest at the middle and narrower at each end.

5. Spatulate leafshape: Is spoonshaped.

6. Oblanceolate leafshape: Is longer than it is wide; broadest at the middle and narrower at each end.

7. Obovate leafshape: The prefix "ob" indicates the inverse; thus, eggshaped but broadest at the top.

8. Obcordate leafshape: Is heartshaped, but broadest th the apex or leaf top.

9. Oblong leafshape: Is longer than broad, almost rectangular.

10. Linear leafshape: Is long and very narrow.

11. Cuneate: Is wedge-shaped with essentially straight sides. The leaf is attached at the narrow end.

12. Peltate leafshape: Is when the petiole is attached inside the leaf margin, thus being shield-shaped.

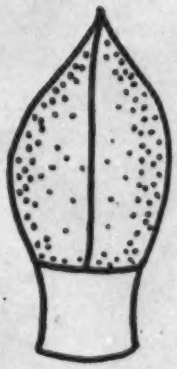
13. Reniform leafshape: Is kidney shaped.

14. Hastate leafshape: Is having the shape of an arrow head and the basal lobes are pointed outwards at or near a right angle to the leaf midrib.

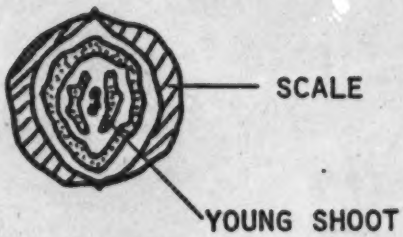
TYPES OF BUDS

IMBRICATE, SCALY

X - SECTION
IMBRICATE

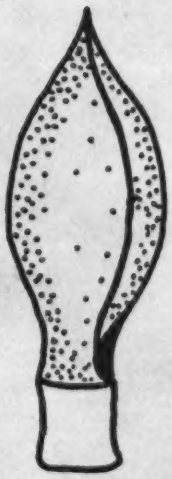


VALVATE, SCALY



X - SECTION
VALVATE

NAKED



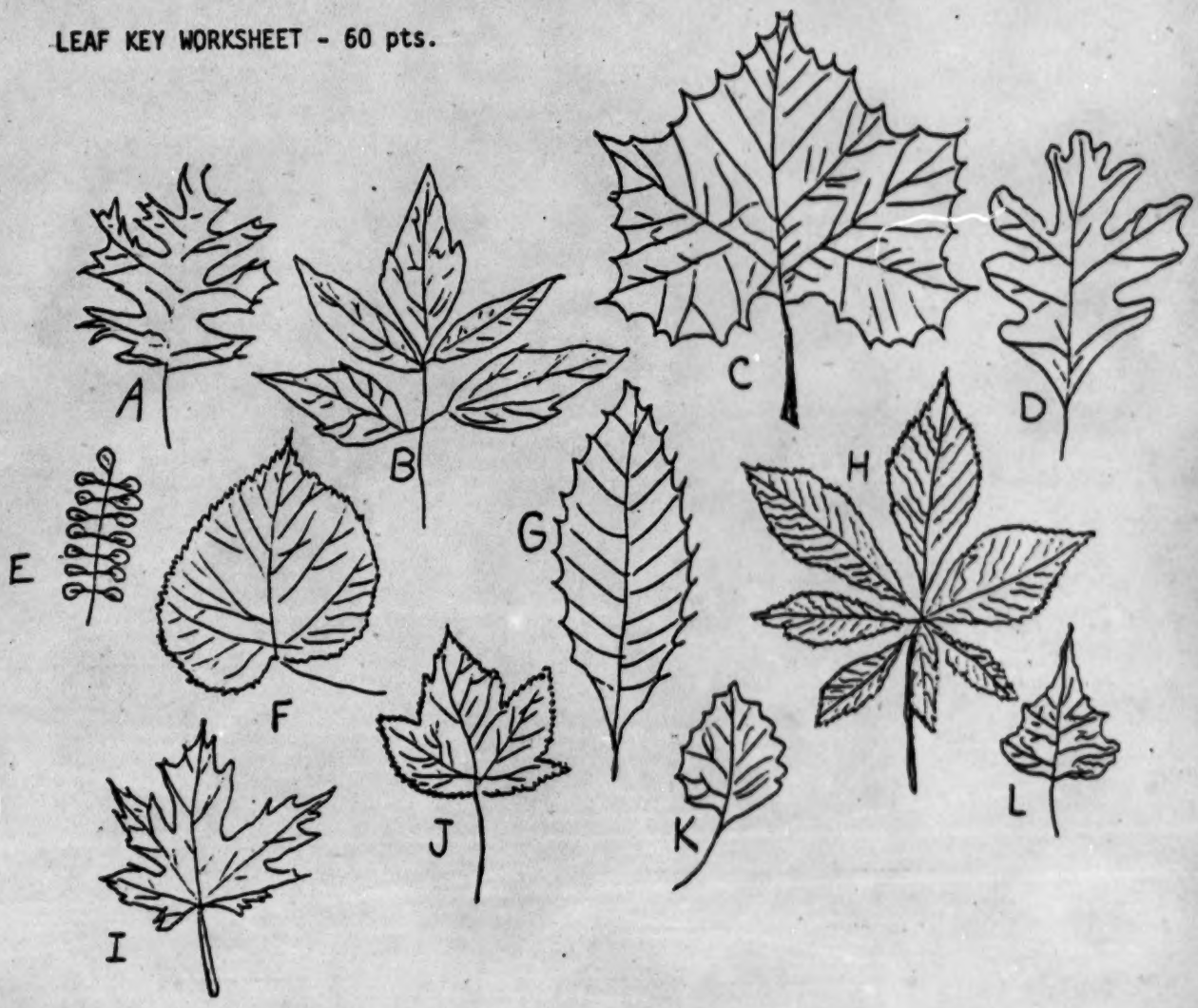
STALKED

STUDENT SKILL CHECKLIST

The following characteristics of the leaf were identified:

		Pts. Possible	Student Score
1.	Leaf type	10	____
2.	Leaf arrangement	10	____
3.	Location of the bud	10	____
4.	Leaf venation	10	____
5.	Leaf margin	10	____
6.	Leaf shape	10	____
7.	Leaf base	10	____
8.	Noticeable twig characteristics	10	____
9.	Fruit types	10	____
10.	Deciduous or evergreen	10	____
	TOTAL	100	

LEAF KEY WORKSHEET - 60 pts.



#1-6 ARRANGEMENT - Fill in the appropriate blank with SIMPLE or COMPOUND, whichever represents the lettered leaf's arrangement. 3 pts. each.

#7-12 VENATION - Fill in the appropriate blank with PINNATE or PALMATE, whichever represents the lettered leaf's venation 3 pts. each

#13-15 LOBED - Fill in the appropriate blank with PINNATE or PALMATE, whichever represents the lettered leaf's type of lobing. 3 pts. each

#16-20 EDGE - Fill in the appropriate blank with LOBED or TOOTHED, whichever represents the lettered leaf's type of edge. 3 pts. each

Name _____

LEAF WORKSHEET - 60 pts.

ARRANGEMENT - Simple or Compound
(Example C) - simple

1-H _____ 4-D _____

2-B _____ 5-F _____

3-E _____ 6-L _____

VENATION - Pinnate or Palmate
(Example I) palmate

7-E _____ 10-J _____

8-D _____ 11-C _____

9-A _____ 12-H _____

LOBED - Pinnate or Palmate
(Example J) palmate

13-A _____

14-I _____

15-D _____

EDGE - Lobed, Toothed, or Wavy
(Example F) toothed

16-G _____

17-J _____

18-K _____

19-D _____

20-A _____

LEAF WORKSHEET - Answer Key

ARRANGEMENT

1-H - Compound
2-B - Compound
3-E - Compound
4-D - Simple
5-F - Simple
6-L - Simple

VENATION

7-E - Pinnate
8-D - Pinnate
9-A - Pinnate
10-J - Palmate
11-C - Palmate
12-H - Pinnate

LOBED

13-A - Pinnate
14-I - Palmate
15-D - Pinnate

EDGE

16-G - Toothed
17-J - Lobed
18-K - Wavy
19-D - Lobed
20-A - Lobed

LEAF TEST--Figures A-S

LEAF TEST - Answer Key

Matching

1. B
2. E
3. D
4. A
5. C

True-False (use lettered leaf figures)

Arrangement

6. True
7. False
8. True
9. True
10. True

Venation

11. False
12. True
13. True
14. True
15. False

Lobed

16. False
17. False
18. False
19. False
20. True

Edge

21. True
22. False
23. True
24. False
25. True

Tips

26. True
27. False
28. False

Bases

29. False
30. False

Edge

31. True
32. True
33. True

Shape

34. False
35. False

Morphology

36. True
37. False
38. True
39. True
40. True

Keying - List all steps followed & species
(using National Audubon Hardwood Key or Cone-Bearing Key)

41. 1 1 17 17 21 22 22 23. Red Maple.
not strongly resinous when crushed.

42. 1 1 17 17 21 21 25 26 26 27. Tulip.

43. 1 1 17 18 18 20 20. Dogwood.

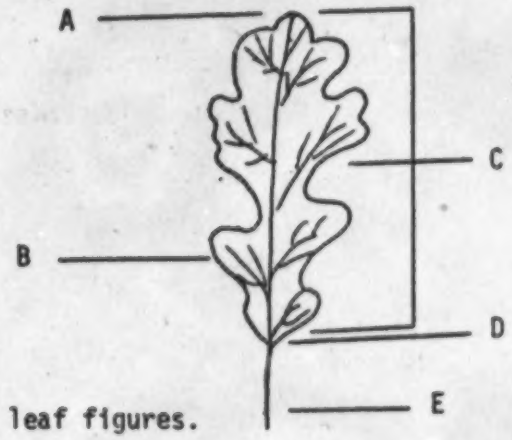
44. 1 1 17 17 21 21 25 25 28 28 34 34 43 43 45
45 46 47 47 49. Quaking Aspen.

45. 1 2 2 3 3 4 4. Eastern White Pine.

Do not write on this test. Use the answer sheet provided.

Matching

1. Lobe
2. Petiole
3. Base
4. Tip
5. Blade



True-False -- Use the lettered leaf figures.

6. Figure B is simple.
7. Figure R is simple.
8. Figure J is simple.
9. Figure M is compound.
10. Figure I is compound.

Arrangement

11. Figure C is pinnate.
12. Figure F is pinnate.
13. Figure A is pinnate.
14. Figure D is palmate.
15. Figure N is palmate.

Venation

16. Figure Q is pinnate.
17. Figure O is pinnate.
18. Figure D is pinnate.
19. Figure B is palmate.
20. Figure C is palmate.

Lobed

21. Figure J is toothed.
22. Figure A is toothed.
23. Figure E is wavy. — Edge
24. Figure M is lobed.
25. Figure D is lobed.
26. Figure O is long-tapering
27. Figure M is long-tapering — Tips
28. Figure P is obtuse.
29. Figure S is asymmetrical.
30. Figure C is heart-shaped. — Bases
31. Figure F is truncate.
32. Figure J is double-toothed. — Edge
33. Figure M is toothed.
34. Figure G is oblanceolate. — Shape
35. Figure B is obovate.
36. Gymnosperms do not have flowers.
37. Gymnosperms produce seeds in a vessel.
38. Pines are gymnosperms.
39. Monocots have parallel veins.
40. Dicots display vascular bundles in rings.

Keying

41. C
42. Q
43. P
44. E
45. K

Name_____

LEAF TEST - Answer Sheet

Matching

1. ____
2. ____
3. ____
4. ____
5. ____

True-False -- Use lettered leaf figures.

Arrangement

6. ____
7. ____
8. ____
9. ____
10. ____

Lobed

16. ____
17. ____
18. ____
19. ____
20. ____

Tips

26. ____
27. ____
28. ____

Bases

29. ____
30. ____

Venation

11. ____
12. ____
13. ____
14. ____
15. ____

Edge

21. ____
22. ____
23. ____
24. ____
25. ____

Edge

31. ____
32. ____
33. ____

Shape

34. ____
35. ____

Morphology

36. ____
37. ____
38. ____
39. ____
40. ____

Keying - List all steps followed & species
(using National Audubon Hardwood Key or Cone-Bearing Key)

41. ___ ___ ___ ___ ___ ___ ___ ___. _____.

42. ___ ___ ___ ___ ___ ___ ___ ___ 26 ___. _____. (not strongly resinous when crushed.

43. ___ ___ ___ ___ ___ ___ ___. _____.

44. ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ 43 45
45 46 ___ ___ ___. _____.

45. ___ ___ ___ ___ ___ ___ ___. _____.

WOODY ORNAMENTALS

Quiz

Matching

D 1. Tree having milky sap.

L 2. Tree with simple leaf, woody strobile type fruits, good in wet locations.

M 3. Tree bearing attractive white flowers before leafing out.

H 4. Hybrid cross between the Ohio Buckeye and the Common Horsechestnut.

C 5. Palmate leaf type, leaves purple.

E 6. Tree having red petioles and samara fruit types.

G 7. Slow growing maple which turns brilliant yellow, orange, and red.

B 8. Exfoliating cinnamon brown bark.

A 9. Excellent small 15-18' tree, three-lobed leaf, turns red in fall.

F 10. Maple leaf with the deepest sinuses.

A. Acer ginnala
B. Acer griseum
C. Acer palmatum
D. Acer platanoides
E. Acer rubrum
F. Acer saccharinum
G. Acer saccharum
H. Aesculus carnea
I. Aesculus glabra
J. Aesculus hippocastanum
K. Ailanthus altissima
L. Alnus glutinosa
M. Amelanchier laevis
N. Aralia spinosa
O. Asimina triloba

Woody Ornamentals

MATCHING

D	1. Tree having milky sap.	A. Acer ginnala
L	2. Tree with simple leaf, woody strobile type fruits, good in wet locations	B. Acer griseum
M	3. Tree bearing attractive white flowers before leafing out	C. Acer palmatum
H	4. Hybrid cross between the Ohio Buckeye and the Common Horsechestnut	D. Acer platanoides
C	5. Palmate leaf type, leaves purple	E. Acer rubrum
E	6. Tree having red petioles and samara fruit types	F. Acer saccharinum
G	7. Slow growing maple which turns brilliant yellow, orange, and red	G. Acer saccharum
B	8. Exfoliating cinnamon brown bark	H. Aesculus carnea
A	9. Excellent small 15-18' tree, three lobed leaf, turns red in fall	I. Aesculus glabra
F	10. Maple leaf with the deepest sinuses	J. Aesculus hippocastanum
		K. Ailanthus altissima
		L. Alnus glutinosa
		M. Amelanchier laevis
		N. Aralia spinosa
		O. Asimina triloba

KEY TO CONE-BEARING TREES

(1) Leaves needle-like or scale-like. (2)

(2) Leaves scale-like. (3)

(3) Leaves dark-green, overlapping, 0.6". New foliage is pointed & prickly. - Eastern Red Cedar.

(3) Leaves yellowish-green, 0.1-0.3". - Northern White Cedar.

(2) Leaves needle-like (3)

(3) Leaves grow singularly. - Spruce

(3) Leaves in clusters of 2 or more. (4)

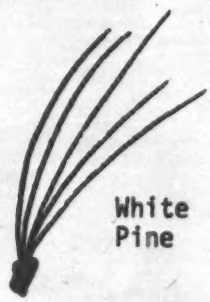
(4) Leaves in clusters of 10 or more, falling off in autumn. - Larch

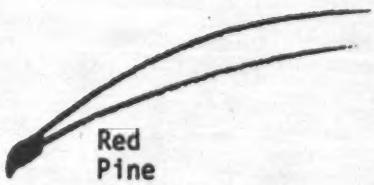
(4) Leaves in clusters of 2. (5)

(5) Most or all leaves longer than 4". Cones oval-shaped, 1-2". -Red Pine

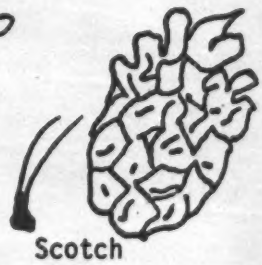
(5) Leaves stiff, dark-green, 1-2". Cones are slender shaped. Bark is dark gray. - Jack Pine

(5) Leaves stiff, yellowish-green, 1-2". Cones rounded. Bark is redish. - Scotch Pine


White Pine


Red Pine

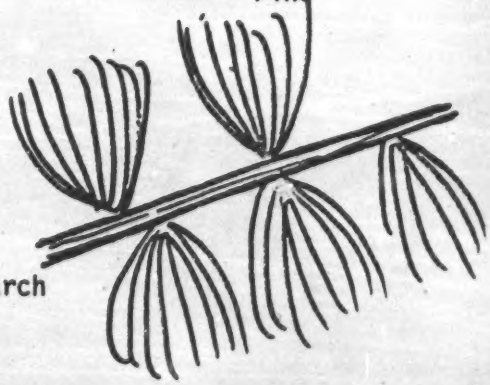
Jack Pine

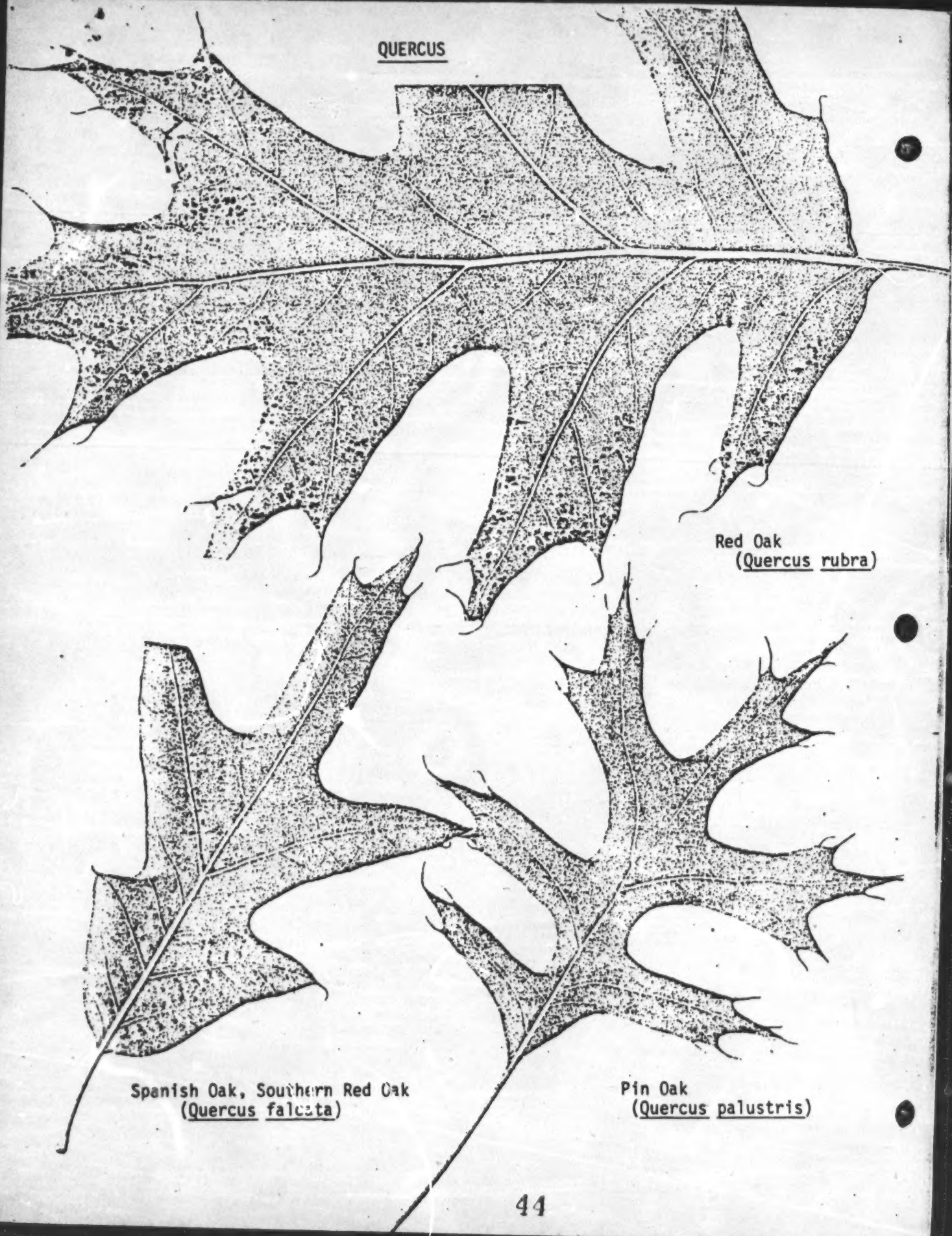

Scotch Pine

Eastern Red Cedar

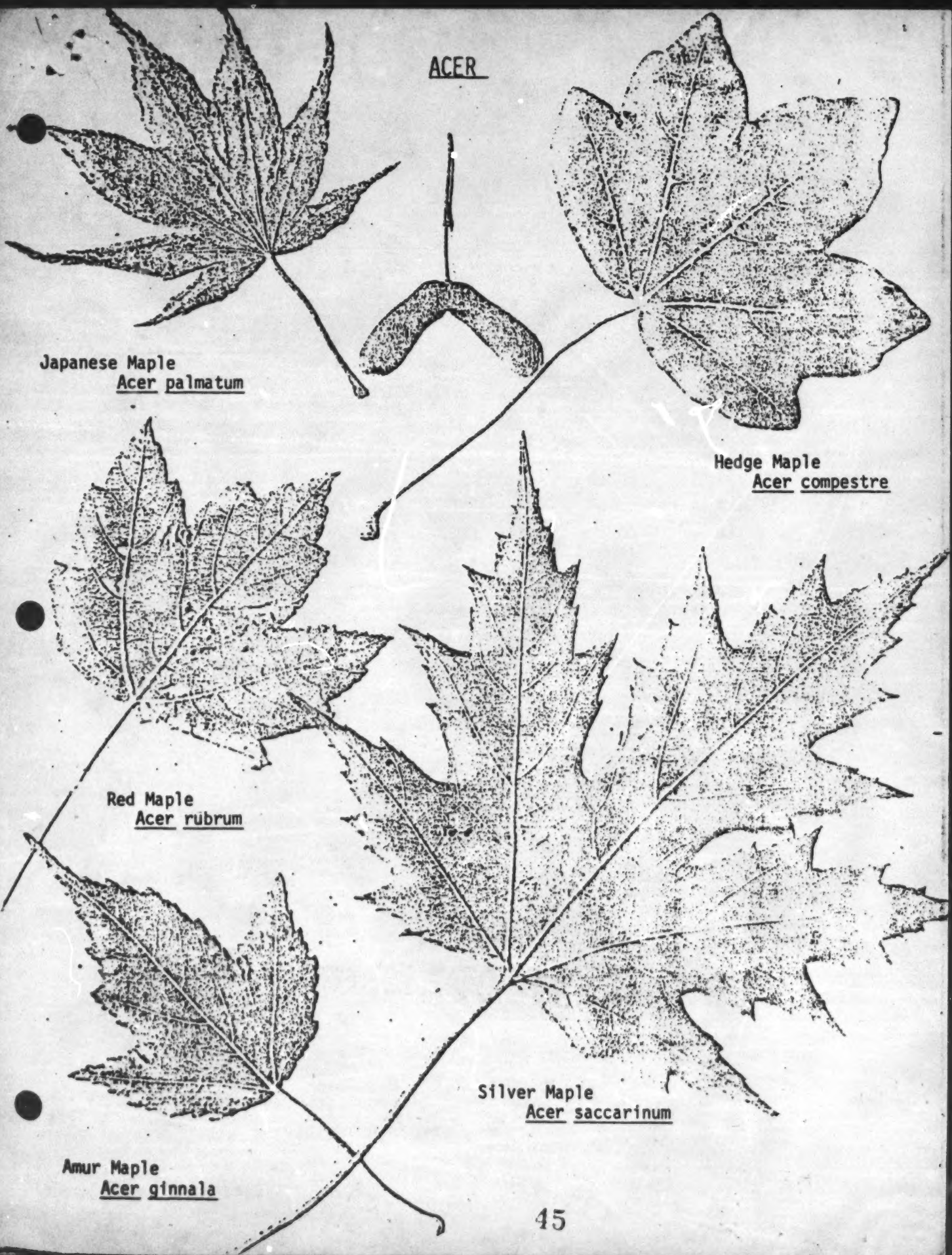
Northern

Spruce


Larch


QUERCUS
Red Oak
(Quercus rubra)
Spanish Oak, Southern Red Oak
(Quercus falcata)
Pin Oak
(Quercus palustris)

ACER



Japanese Maple
Acer palmatum

Hedge Maple
Acer compestre

Red Maple
Acer rubrum

Silver Maple
Acer saccarinum

Amur Maple
Acer ginnala